

FILTER CARTRIDGE AND SUPPORT FOR USE IN SUCH A CARTRIDGE

5 The invention relates to an inward flow filter cartridge and to a support for use in such a filter cartridge of the kind which uses a sleeve of filter material having open pleats and which is carried by a perforated cylindrical member.

Hitherto supports have not been used in the cartridges of this kind, as the filter material is usually rigid enough on its own.

10 However, the filter material pleats can be sucked to collapse if the pressure gradient through them becomes too high and the advantages of having a pleated filter cartridge with a relatively large filter surface and a very little volume are lost.

15 One means for preventing such collapse has been to use a pleated wire mesh but this is a complicated solution and the manufacture and cost of assembly of such units is costly.

20 In certain types of filter cartridges it has been proposed to overcome this inconvenience by using supports in for example, quadratric filter cells, corrugated aluminium foil as a support for the filter material. However this is also a complicated and expensive solution.

25 It is among the objects of the present invention to provide a filter cartridge of the kind set forth where the above mentioned drawbacks are avoided, and where the supports can be produced of an inexpensive material having a low weight, that is easy to manufacture, and where the costs of production are low.

According to the present invention an inward flow filter cartridge comprises a perforated cylindrical member having a surrounding sleeve of filter material provided with axially extending

open pleats, and strip like rigid spatial supports having a transverse cross-section which increases in width from a narrow side edge to a base side edge, said supports being located in the pleats of said sleeve of filter material with their wider base side edges adjacent the perforated cylindrical member so as to maintain the pleats of filter material open and support the pleats against inward collapse against the cylindrical member.

Thus a light construction of filter cartridge can be obtained which is able to resist pressure gradients up to a certain limit without being sucked to collapse.

The invention also includes a support for use in an inward flow filter cartridge as set forth and comprising a strip formed as a rigid spatial support having a cross-section which increases in width from a narrow side edge to a base side edge and adapted to bear against the perforated cylindrical member of said inward flow filter cartridge when located in a pleat of said sleeve, said strip being formed with pleats the adjacent fold lines of which diverge or converge (amplitude of the) pleating extending from substantially zero at the narrow side edge, which is substantially flat and straight, to a maximum at the base side edge.

Thus the support can be made from an organic foil.

The supports proof against pressure depends on the capability of the material to maintain the open pleating.

Conveniently the support can be made from a formstable synthetic plastics material, for example polycarbonate or polyethylene. With this formstable pleating the filter can resist even large pressure gradients, ensuring that during the lifetime of the filter all the filter surface is available for filtering.

The invention can be performed in various ways but one embodiment will now be described with reference to the drawings in which:

- 5 Figure 1 is an isometric view of a filter cartridge incorporating the invention;
- Figure 2 is an isometric view of a support according to the invention for use in the filter cartridge shown in Figure 1;
- 10 Figure 3 is a side view of the support shown in Figure 2;
- and,
- Figure 4 is a plan view of the support shown in Figure 2.

15 An inward flow filter cartridge 1 according to the invention is provided with two flanged end members 2 which can be used for securing the cartridge and between which extends a perforated cylinder member 3. This member 3 is in the form of a tube formed from perforated sheet. A sleeve of open pleated filter material 4 is located around tube 3 against which the bases of the

20 open axially extending pleats rest. Located in each of the pleats between the filter material and the cylindrical member 3 is a support and separator 5 and these prevent inward collapse of the pleats which could be caused by suction on the filter sleeve 4.

25 In use the filter cartridge is placed in a filter and particle carrying air flow passes from the outside of the filter cartridge through the filter material 4 and the tube 3 and out through one of the end members 2. The open pleats of the filter material are, depending upon the pressure difference between the outside and the inside of the filter cartridge, subjected to certain pressure forces which, with the flow resistance caused by the

30 filter material 4 urge the sleeve of filter material against the tube 3. After some use of the filter the flow resistance increases

due to the amount of particles caught in the filter material and the pressure force acting against the pleats is therefore increased. Without supports the filter material tends to be sucked to collapse and thus the pleats are unevenly distributed round the circumference of the cartridge. Eventually, only a small portion of the filter material is left as a working filter and this rapidly lowers the capacity of the filter and calls for cleansing or replacement. Supports 5 however rest against the cylindrical member 3 and prevent collapse of the pleats so that the filter can work to full capacity during its lifetime independent of the pressure difference between the outside and the inside of the filter material.

As will be seen from Figures 2, 3 and 4 the supports, which are arranged to extend lengthwise in the open pleats, are in the form of strip-like rigid spatial supports. The outwardly facing narrow edge 6 of each strip which is intended for location adjacent the closed narrow outer portion of a pleat in the filter material is in the form of a line which is substantially flat and straight and is constituted merely by the thickness of the material from which the strip is formed. The other base side edge 7 of the strip which is to be adjacent the open wide portion of a pleat is in the form of a series of corrugations formed by pleats the adjacent fold lines of which diverge or converge. The portion 8 of each of the corrugations comprises a projecting rib having an edge 9 and the portion 10 of each of the corrugations has a flat outer surface 11 which is in the form of an inverted triangle. Thus, it will be seen that the amplitude of the pleating and thus the transverse cross-section, increases from substantially zero at the narrow outer edge 6 to a maximum at the other base side edge 7. The base side edge 7 of each strip is located against the perforated cylindrical member 3 so that it is held in place within its open pleat in the filter material.

The strip can be formed from any convenient material, for example, in the form of an organic foil, and convenient materials are a form stable synthetic plastics material such as polyethylene or polycarbonate.

It will be appreciated that the support strips 5 act to maintain the shape of the open pleats in the filter material 4 but, because of their spatial construction, there is no substantial effect upon the fluid flow through the filter material.



CLAIMS

1. An inward flow filter cartridge comprising a perforated cylindrical member having a surrounding sleeve of filter material provided with axially extending open pleats, and strip-like rigid
5 spatial supports having a transverse cross-section which increases in width from a narrow side edge to a base side edge, said supports being located in the pleats of said sleeve of filter material with their wider base side edges adjacent the perforated cylindrical member so as to maintain the pleats of filter material open and support the
10 pleats against inward collapse against the cylindrical member.
2. A filter cartridge as claimed in claim 1 in which each support is formed with a pyramidal pleating the amplitude of the pleating extending from substantially zero at the narrow side edge to a maximum at the base side edge.
- 15 3. A filter cartridge as claimed in claim 2 in which each support is made from an organic foil.
4. A filter cartridge as claimed in claims 1 to 3 in which each ~~the~~ support is made from a formstable synthetic plastics material.
5. A filter cartridge as claimed in claim 4 in which each
20 support is made from polyethylene or polycarbonate.
6. A filter cartirdge substantially as described herein with reference to and as shown in the accompanying drawings.
7. A support for use in an inward flow filter cartridge of the kind claimed in claim 1 comprising a strip formed as a rigid spatial
25 support having a cross-section which increases in width from a narrow side edge to a base side edge and adapted to bear against the perforated cylindrical member of said inward flow filter cartridge when located in a pleat of said sleeve, said strip being formed with pleats the adjacent fold lines of which diverge or converge and the amplitude of the pleating



extending from substantially zero at the narrow side edge, which is substantially flat and straight, to a maximum at the base side edge.

8. A support as claimed in claim 7 in which the support is made from an organic foil.
9. A support as claimed in claim 7 in which the support is made from a formstable synthetic plastics material.
10. A support as claimed in claim 9 in which the support is made from polyethylene or polycarbonate.
- 10 11. A support as claimed in claim 7 and substantially as described herein with reference to an as shown in Figures 2, 3 and 4.
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